



Mapping Greenland's glaciers and icecaps with object based image analysis

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The melting of glaciers and ice caps has been mentioned in the IPCC reports as a most important process contributing to the observed global sea-level rise. The exact knowledge of glacier distribution and their topographic parameters is therefore a mandatory pre-requisite to obtain more reliable projections of global sea-level rise.

In the framework of the EU funded FP7 project ice2sea we create a new inventory for the local glaciers and ice caps on Western Greenland using Landsat imagery acquired around the year 2000 and the ASTER GDEM for derivation of topographic parameters. Apart from the typical problems debris-cover, adverse snow conditions and clouds, a special challenge for pure optical classification methods in this region are deep shadows due to low solar elevation and ice bergs on the surrounding fjords. For this reason an object-oriented glacier classification algorithm has been developed that is evaluated against manual delineation and the well established semi-automated and pixel-based methods like image segmentation from band ratios. The additionally used GDEM was helpful for some of the problematic regions but due to local artifacts of the DEM classification is degraded in other regions. Overall, we found the classification accuracy of the object oriented approach superior to other methods but the pre-processing workload is clearly higher and might not be justified for other regions.